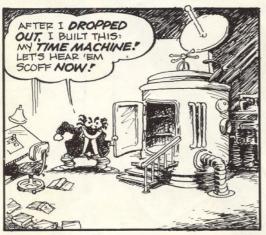
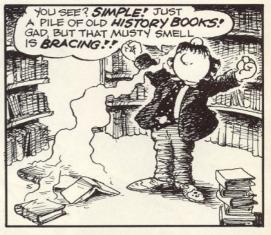


INTRODUCTION.





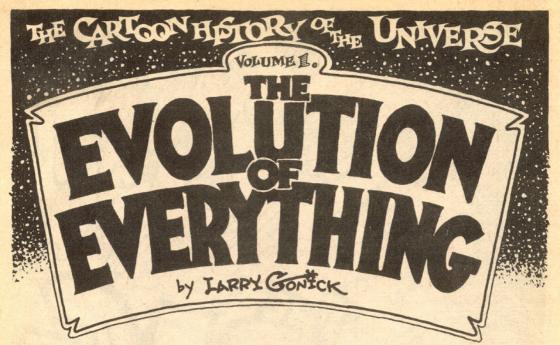








THE CARTOON HISTORY OF THE UNIVERSE, VOLUME I, THE EVOLUTION OF EVERYTHING IS COPYRIGHT ©1978 BY LARRY GONICH AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION OF THE ARTIST. IT IS PUBLISHED BY THE RIP OFF PRESS, INC., 80% 14158, SAN FRANCISCO, CALIFORNIA 94114."





FORE TIME BEGAN, THE ENTIRE UNIVERSE WAS PRESSED TOGETHER IN ONE HOT LUMP. THEN CAME...











MODERN THEORIES HAVE MORE TO EXPLAIN, SUCH AS WHY THE GALAXIES ARE RECEDING. FOR INSTANCE, THERE'S THE LITTLE-KNOWN CONSPIRACY THEORY (VERY MODERN):



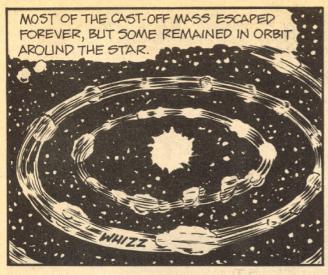
NOWADAYS, NEARLY EVERYONE ACCEPTS THAT THE UNIVERSE STARTED WITH A BANG, BUT NO ONE CAN FIGURE OUT HOW IT'S GOING TO END!



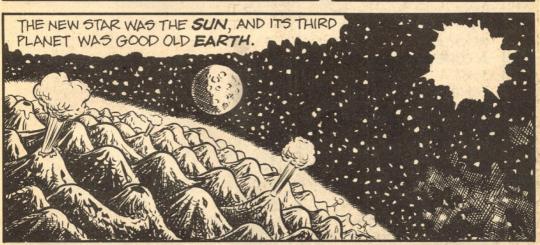








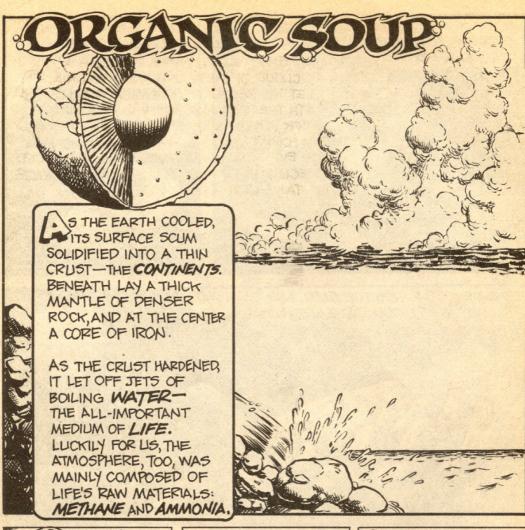










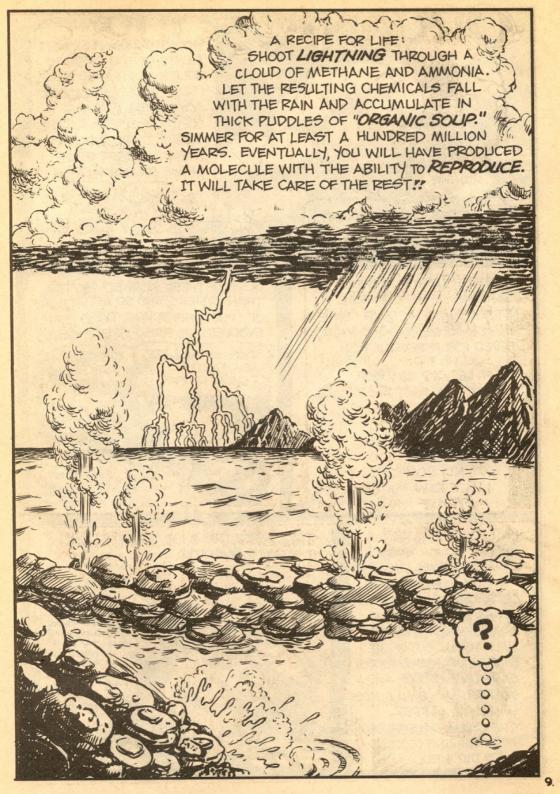






ONE SURPRISING RESULT OF RADIO-DATING 15 THAT THE EARLIEST EVIDENCE OF LIFE (3.5 BILLION YEARS OLD) 15 ALMOST AS OLD AS THE VERY OLDEST ROCKS (3.7 BILLION YEARS). APPARENTLY, RADIATION DIDN'T FAZE EARLY LIFE FORMS!

YOU CLOSE YER EYES
FER A HUNDRED MILLION
YEARS, AND THE NEXT
THING YOU KNOW, YER
COVERED WITH GREEN
SLIME!





USING THE COMPLEX INGRE-DIENTS OF THE ORGANIC SOUP, THIS STRANGE MOLE-CULE, CALLED A NUCLEIC ACID, BEGAN MAKING COPIES OF ITSELF. ALL THE COPIES COPIED, TOO, AND SOON THE BEST STUFF IN THE SOUP WAS EATEN UP!

MINE!) (MINE!

THE NUCLEIC ACID RESPONDED BY ORGANIZING LITTLE CHEMICAL FACTORIES, WHICH COULD CONVERT SIMPLER FOODS INTO THE MATERIALS NEEDED FOR REPRODUCTION.









SOME OF THESE WORKED BETTER THAN OTHERS, AND SO, AFTER EONS OF TRIAL AND ERPOR, TRUE LIFE EVOLVED: THE FIRST CRUDE CELLS.

THIS IS THE LIFE, J 公@报的 EH, FRED? CHOFF CHOFF?



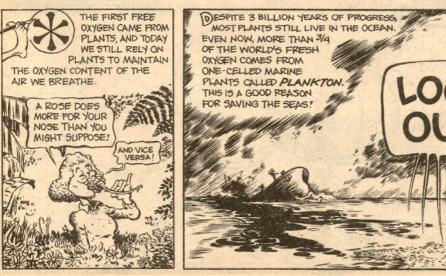
C ONE DAY MORE THAN 3 BILLION YEARS AGO, SOME LUCKY CELL DISCOVERED CHLOROPHYLL. WHEN EXPOSED TO THE SUN. THIS GREEN CHEMICAL HELPED BUILD TISSUE OUT OF THE SIMPLEST POSSIBLE FOODS: CARBON DIOXIDE AND WATER, HAVING AN ALMOST UNLIMITED LARDER, THE CELL AND ITS CHLORO-PHYLL-BEARING DESCEND. ANTS DID WELL.

THE FIRST PLANTS. FRED COUGH. I DON'T THINK I CAN HOLD OUT MUCH LONGER against These

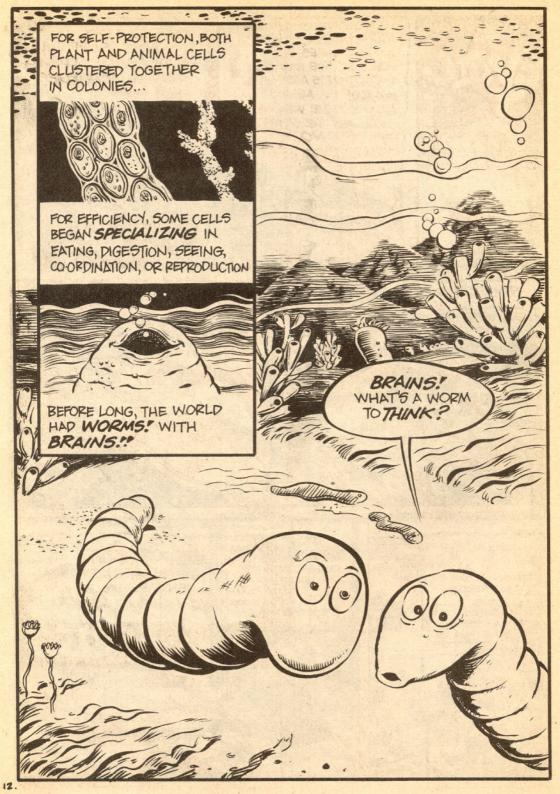
THEY WERE THE BLUE-GREEN ALGAE-







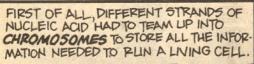














WHICH ARE HIGHLY COMPLEX,
EVOLVED FROM CO-OPERATIVE
ARRANGEMENTS AMONG EARLIER,
SIMPLER CELLS...

HOWZIT GOIN'
AT YOUR END OF
THE PROTOPLASM P.

INDIVIDUALITY: HEY,
IT'S TOO
LATE NOW,
JACK!

ZVP

IT IS BELIEVED THAT MODERN CELLS.

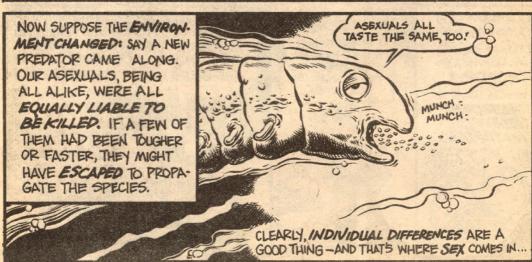






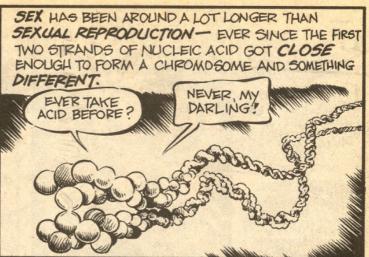






SEX 15 A GENETIC
WAY OF CREATING
AND TRANSMITTING
INDIVIDUAL DIFFERENCES
WITHIN A POPULLATION...









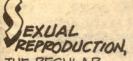
LACTERIA,

THE EXPERIMENT: TWO STRAINS OF THE GONORRHEA-CAUSING BAC-TERIUM GONOCOCCUS, ONE RESISTANT TO PENICILLIN AND THE OTHER NOT, WERE COMBINED IN A DISH.



AFTER A TIME, ALL THE GONOCOCCI COULD RESIST PENICILLIN. IT TURNED OUT THE BACTERIA HAD PAIRED OFF, AND THE RESISTANT ONES HAD MODIFIED THE GENES OF THE OTHERS — A SMALL BUT SOPHISTICATED ACT OF SEX!





THE REGULAR
USE OF SEX IN THE
REPRODUCTIVE
PROCESS, BEGAN
AS A PERVERSION
OF ORDINARY
REPRODUCTION.
WHO KNOWS WHY?



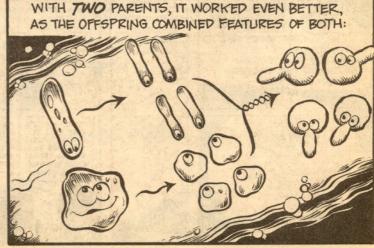




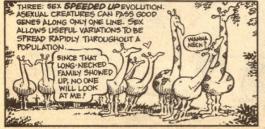




YES, BY SPLITTING
INTO GAMETES AND
RECOMBINING, THE
CELL HAD FOUND A
WAY TO REPRODUCE
AND SHUFFLE ITS
GENES AT THE SAME TIME.



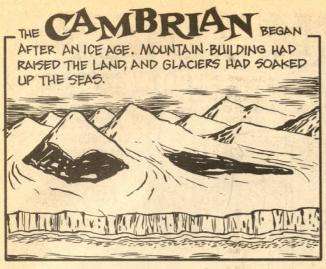






MODERN TIMES

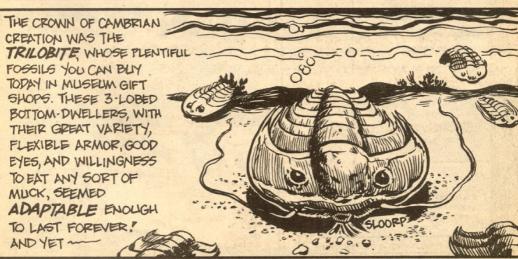
			gard. A	THANKS PARTLY TO SINCE THEN, THE FOSSIL PECORD HAS BEEN SEX, LIFE REALLY
ERAS	PERIOD5	PURA- TION	YEARS AGO	BEGAN TO FLOURISH PERMIT THIS CLASSIFICATION OF THE FARTH'S "PECENT HISTORY."
	QUATERNARY THE WEIRDEST MANMAL OF THEM ALL.	3	3_	PRIMATES PRIMATES
MESOZOVC	TERTIARY WEIRD MAMMALS	65	68-	DOLPHINS DOGS, DOLPHINS BEARS TITANO- THERES TOTAL
	CRETACEOUS T. REX. YS. THE FLOWERS	72	-140-	PI-TING REPTILES DINOSAURS
	JURASSIC BIRDY AND BRONTY	65	205-	ARCHAEOPTERYX THECODONTS TINY MAMMALS MAMMAL-Like
	TRIASSIC TINY MAMMALS	25	230-	
	PERMIAN WEIRD REPTILES	55	285-	PEPTILES BUT
	CARBONIFEROUS THE PUTURE IS COAL-BLACK	65		SHARKS - AND FIRST PISH PISH PISH
PALEOZOVC	DEVONIAN FISH AND FOREST	60	-350- -410- -430-	LOBE: FINS
	SILURIAN ON THE BEACH	20		ARMORED FISH SWAILS
	ORDOVICIAN "NO FISHIN"	70	500-	FISHOIDS SURVICE FURNIFIER IN STREET
	CAMBRIAN LIFE IS HARD	100		TRILOBITES WORMS
PRE-CAMBRIAN TIME LASTED 4 BILLION YEARS				SPONGES PROTOZOA

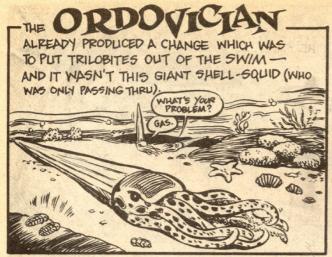














A SMALL, SOFT, WORMY ANIMAL BEGAN TO DEVELOP AN INTERNAL STIFFENING ROD, CALLED A NOTOCORO, RUNNING ALONG ITS CENTRAL NERVE.





THE ANIMAL HAD NO BONES, NO JAWS, AND NO TEETH, YET IT WAS THE PIRST VERTEBRATE, ALMOST A FISH!









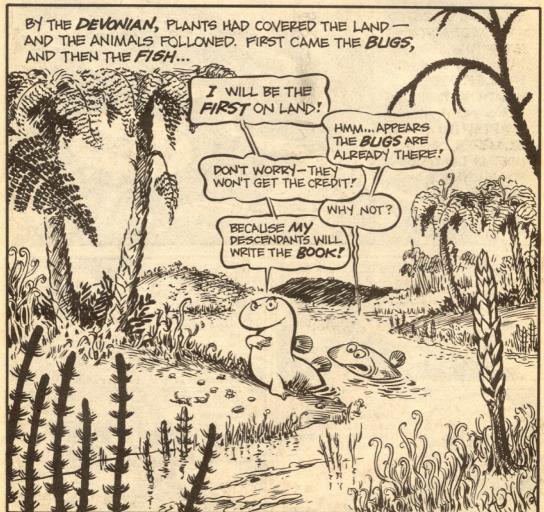
















50 NATURE SELECTED IN FAVOR OF A STRONG SET OF FINS... WHICH GRADUALLY EVOLVED INTO LEGS. FOR BREATHING PURPOSES THE LAND-FISH ADAPTED ITS AIR BLADDER, ORIGINALLY USED IN THE WATER FOR BUOYANCY, INTO LUNGS...











THE CARBONIFEROUS

IS NAMED FOR **COAL**, THE EVENTUAL BY-PRODUCT OF THE FORESTS WHERE ICHTHYOSTEGA'S CHILDREN LIVED THEIR SEMI-FISHY LIVES. ESPECIALLY FISHY WERE THEIR **SEX** LIVES. CONSIDER:



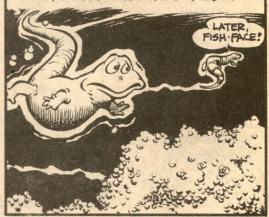
WHEN A MALE AMPHIBIAN SPOTTED A LIKELY FEMALE, HE WENT INTO A SONG AND DANCE.



SHE SIGNALLED ACCEPTANCE BY LAYING A HUGE NUMBER OF SOFT, SHELL-LESS EGGS IN THE WATER...



... AND LEFT THE REST TO HIM. THEY NEVER EVEN TOUCHED!



THE MALE FERTILIZED THE EGGS



THEY HATCHED, AND ANOTHER GENERATION OF AMPHIBIANS BEGAN ITS MISERABLE EXISTENCE...



HEIR SEXUAL
HABITS WERE
KEEPING THE
AMPHIBIANS IN
THE WATER, BUT
HOW TO LAY EGGS
ON DRY LAND?
A PROTECTIVE
SHELL WOULD BE
NEEDED, BUT
THEN HOW COULD
THE EGGS BE
FERTILIZED ??

HOPELESS!

SOME AMPHIBIANS LAID SEMIWERE

SOFT EGGS, WHICH HAD TO BE
PERTILIZED BEFORE THE SHELL
CONGEALED.

VEAH-UHWAIT-ERWAIT-ERWAIT-ERCOULD
SE

I'M GOING BACK
TO BEING A
FISH!

ONE THING LED TO ANOTHER...

MAYBE IF I CLIMB UP HERE...

OO, HERBERT...

...AND SOON, THEY LEARNED TO FERTILIZE THE EGGS
BEFORE THEY WERE LAID —A METHOD WHICH
HASN'T BEEN IMPROVED IN 300 MILLION YEARS.



THEIR HARD-SHELLED EGGS COULD BE LAID ANYWHERE, AND THESE AMPHIBIANS WERE NOW ROMANTIC REPTILES!



IN THE EVOLUTION OF SEX, NO
ANIMALS HAVE ACQUIRED MORE
BIZARRE HABITS THAN THE INSECTS.
ALMOST ALL BEES, FOR EXAMPLE, ARE
FEMALE, AND AT SEASON'S END THEY DRIVE
THE MALES FROM THE HIVE.

IF YOU ASK MB, THEM,
TOTALLY BRAINWISHED.



PRAYING MANTISES MAY HAVE CARRIED OOH,
THIS RITUAL A MITE TOO FAR,
HERBERT, THIS
AS THE FEMALE EATS
THE MALE HIMSELF
AFTER THE ACT.

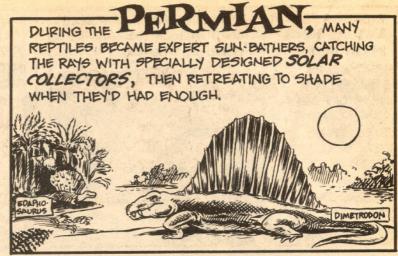
(HOFF CHOPP)

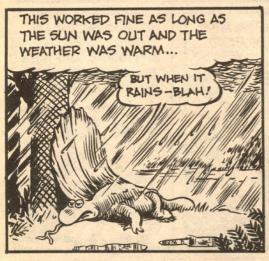




ANOTHER PROBLEM
FACED BY REPTILES
WAS REGULATING
BODY HEAT:
THIS IS HARDER
ON LAND, WHERE
TEMPERATURES
PLUCTUATE MORE
THAN IN THE WATER.

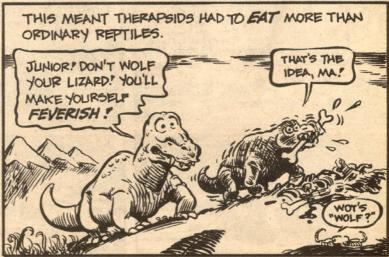








MEANWHILE, IN
COOL PERMIAN
SOUTH AFRICA,
OTHER REPTILES,
THE THERAPSIDS,
WERE LEARNING
TO GENERATE
HEAT INTERNALLY,
BY BURNING THER
FOOD FASTER...



TO GATHER THEIR FOOD MORE ACTIVELY, THERAPSIDS GAVE UP THE SLITHERING GAIT OF THE LIZARDS IN FAVOR OF A MORE UPRIGHT STANCE.



FOR MORE EFFICIENT PROCESSING, THEIR TEETH DIVERSIFIED INTO CUTTERS AND GRINDERS...



HAIR PROBABLY
STARTED AS THERAPSID
SIDE-WHISKERS, USED
TO EXTEND THE SENSE
OF TOUCH, AND THEN
SPREAD OVER THE
BODY LATER, AS A
WAY TO KEEP WARM.



BECAUSE OF THEIR STRUCTURE, TEETH, AND PROB-ABLE HAIR, THE THERAPSIDE ARE ALSO KNOWN AS MAMMAL-LIKE REPTILES.













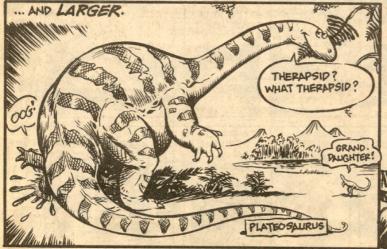
DESCENDED FROM
AQUATIC REPTILES
WHOSE LONG HIND
LEGS WERE ADAPTED
FOR SWIMMING,
THECODONTS FOUND
LONG LEGS TO BE
HANDY ON LAND,
TOO!

OUR FAMILY WILL MAKE GIANT STRIDES!



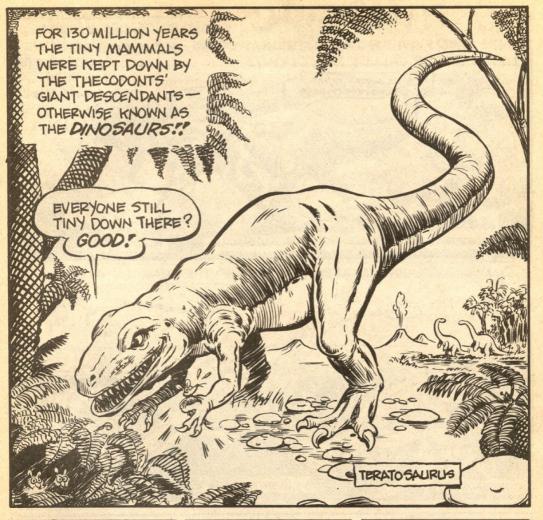
ONLY TWICE IN EARTH HISTORY
HAS A QUADRUPED STOOD UP ON TWO LEGS, AND BOTH TIMES THE EX-PERIMENT WAS A FANTASTIC SUCCESS (FOR THE ANIMAL THAT TRIED IT, ANYWAY)...





UNABLE TO COMPETE WITH SUCH MONSTERS, THE LARGER THERAPSIPS PIED OUT. ONLY A FEW VERY SMALL TYPES SURVIVED TO EVOLVE INTO THE FIRST MAMMALS.





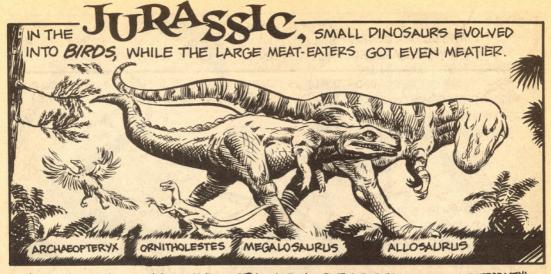


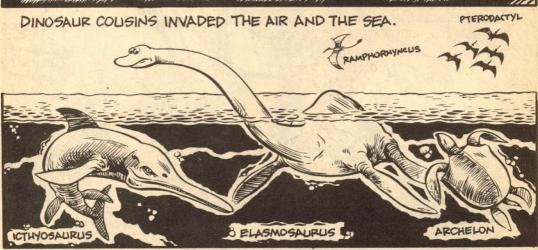
IN AN EFFORT TO BE ACCOMODATING, SCIENTISTS PROPOSED THE THEORY OF MANY CREATIONS: EXTINCT SPECIES HAD BEEN WIPED OUT IN A SERIES OF CATASTROPHES, EACH FOLLOWED BY A FRESH CREATION.

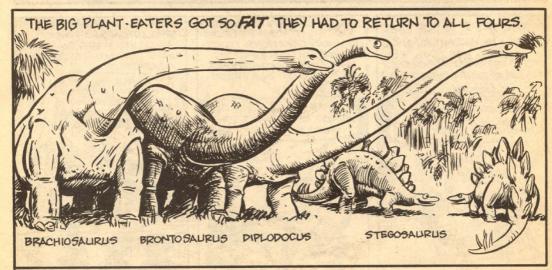
...AND IT REQUIRES ONLY A MINOR RE-WRITE OF A FEW PAGES IN GENESIS!





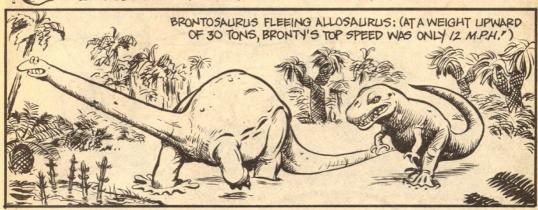


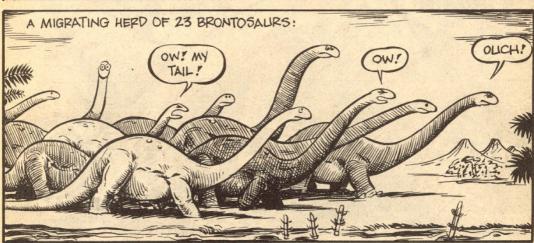


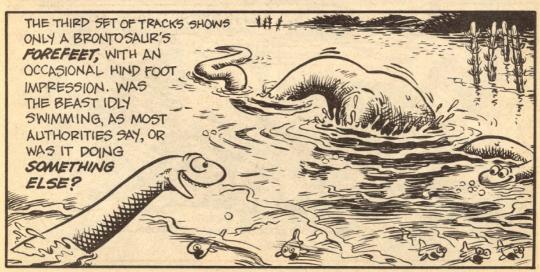


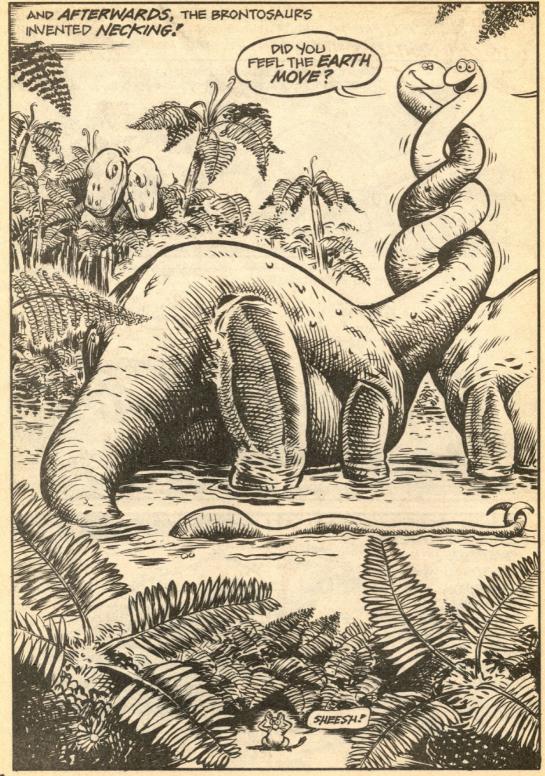


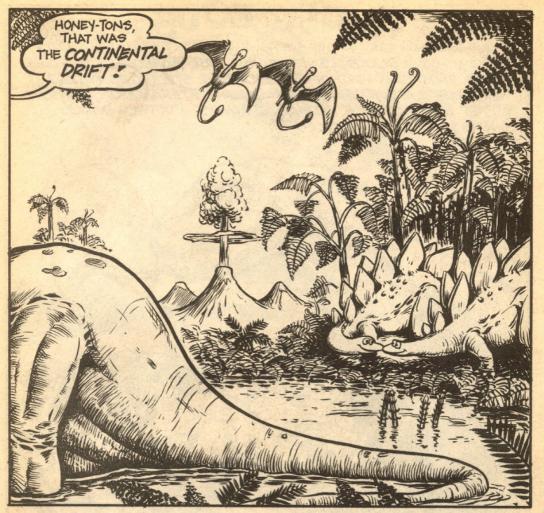
BECAUSE BRONTOSAURS OFTEN WALKED IN MUD, THEY LEFT BEHIND FOSSIL FOOTPRINTS, WHICH HAVE GIVEN US GLIMPSES OF ACTUAL EPISODES OF BRONTOSAURIAN LIFE. HERE ARE THREE:



















-CRETACEOUS

THE CROWDED

OF THE DINOSAUR ERA. IN THIS SCENE, THE GIANT TYRAWNOSAURUS

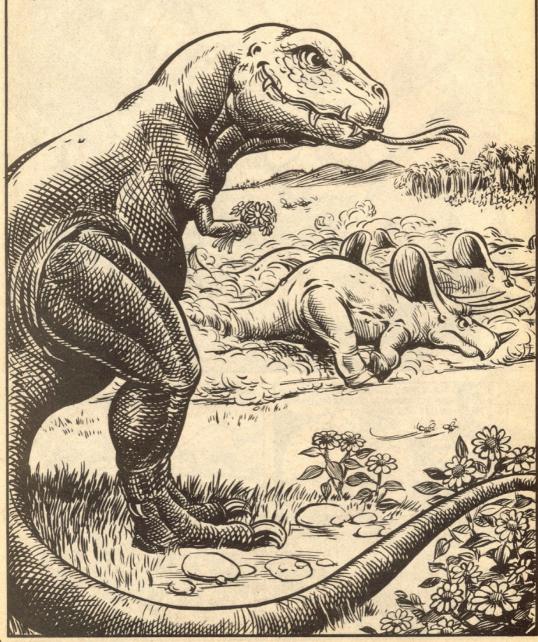
REX EYES SOME DUCKBILLS WHILE HIS COUSIN GORGOSAURUS FLEES

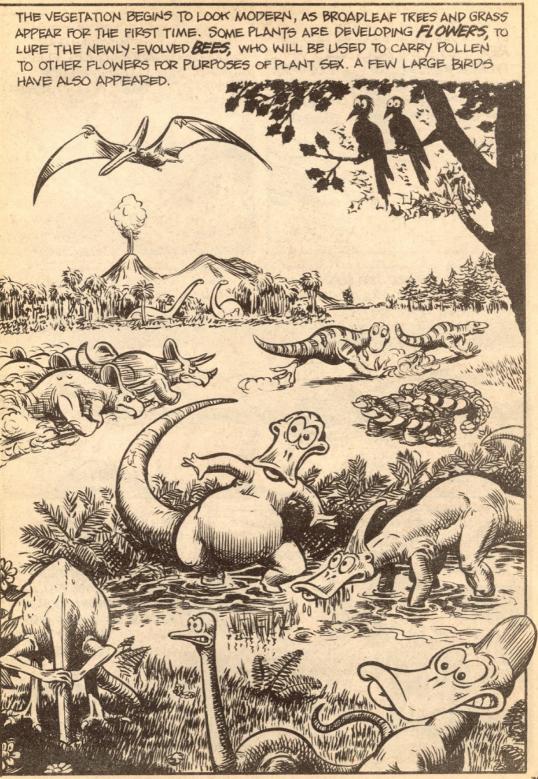
FROM A RAMPAGING HERD OF TRICERATOPS. SPECTATORS INCLUDE

TWO ARMORED ANKYLOSAURS, AN AIRBORNE PTERANODON, AND SOME

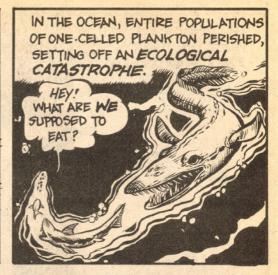
DISTANT TITANOSAURS. STRUTHIOMIMUS ("OSTRICH-MIMIC")

IGNORES THE WHOLE SITUATION!

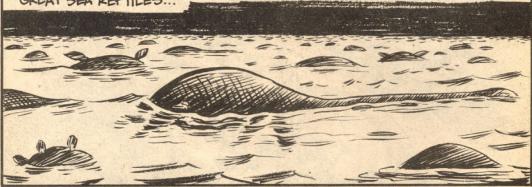




SUPPENLY, AROUND TO MILLION YEARS
AGO, FOR PEASONS THAT ARE STILL
UNCLEAR, THE WORLD COOLED RAPIDLY.



WITH THE BASIS OF THE FOOD CHAIN GONE, MANY FAMILIES OF SEA LIFE WERE WIPED OUT, INCLUDING VARIOUS FISH, SHELLFISH, AND ALL THE GREAT SEA REPTILES...



ON LAND THE DEVASTATION WAS EQUALLY WIDESPREAD. AS PLANTS DIED OUT, ALL ANIMALS BEGAN TO SUFFER, ESPECIALLY THE GIANTS.

THE UNDERNOURISHED
PINOSAURS, LIKE POISONED
BIRDS, LAID EGGS WITH
THINNER AND THINNER
SHELLS. THE EMBRYOS,
UNABLE TO DRAW ENOUGH
CALCIUM FROM THEIR EGGSHELLS TO DEVELOP BONES,
WERE TOO WEAK TO
HATCH...



AFTER 130 MILLION YEARS OF DOMINANCE, THE DINOSAURS HAD FINALLY LEFT THE WORLD TO THEIR OLD COMPETITORS, THE TINY MAMMALS.





THE DISAPPEAR.

THE LATEST EXPLANATION SUG-GESTS THEY WERE DONE IN BY A SUPERNOVA IN OUTER SPACE. THE INTENSE RAPIATION, HARM-FUL IN ITSELF, WOULD ALSO DISRUPT THE WORLD'S CLIMATE, CAUSING THE SUDDEN COOLING EVIDENT IN THE FOSSIL RECORD.



BUT AS THE DEBATE GOES ON, DINOSAUR FANS, REMEMBER: ONLY THE BIG ONES DIED OUT. THE SMALL DINOSAURS, WHICH SPROUTED WINGS, ARE STILL WITH US — AS BIRDS!?



THE AGE OF MAMMALS.





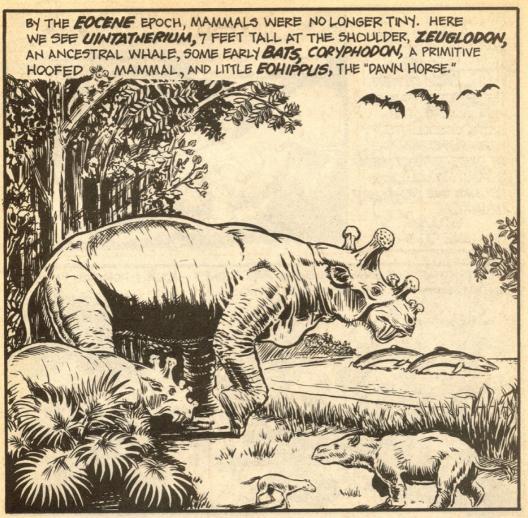






THE 8 FOOT "TERROR CRANE" DINORNIS.







SINCE TRYING TO FLY WOULD BE FATAL, IT'S HARD TO SEE HOW A HALF-WINGED ANIMAL COULD LIVE TO REPRODUCE. AND YET...



THE ANSWER SEEMS TO BE THAT HALF A WING HAS SOME OTHER FUNCTION, LIKE SNAGGING BUGS, AND ONLY LATER IS USED FOR FLIGHT.

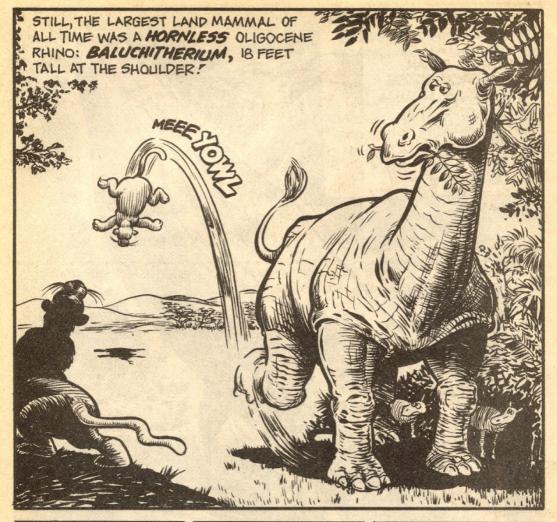


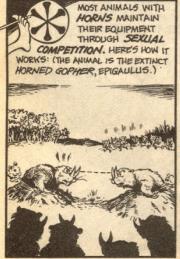
SO MANY DELICIOUS
SPECIES WERE NOW
EVOLVING, THAT
MAMMALS BEGAN
EATING EACH OTHER.
THE EARLIEST MAMMAL
MEAT-EATERS, THE
CRUDE CREODONTS,
WERE PUSHED ASIDE
BY MORE INTELLIGENT
TYPES, WHO QUICKLY
BECAME THE ROYALTY
OF NATURE.





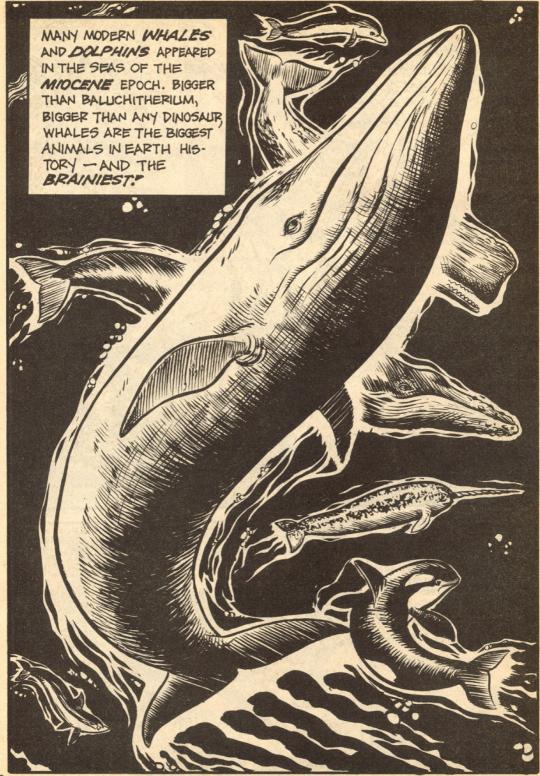


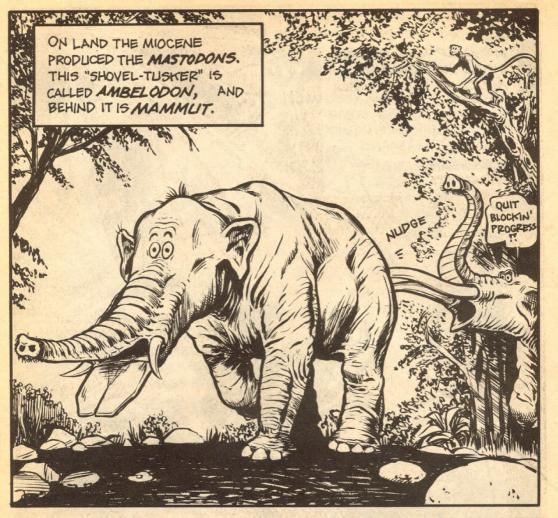
















MARSUPIALS - KANGAROOS, WOM

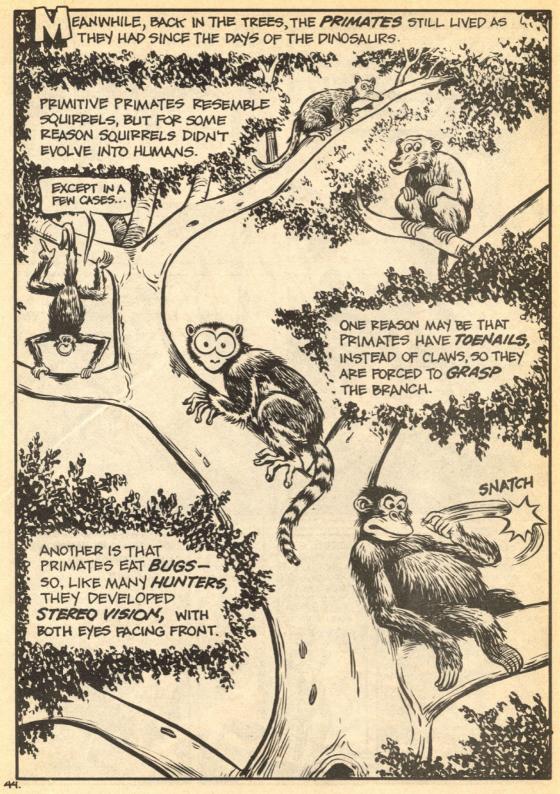
BATS ETC .- GIVE BIRTH TO A

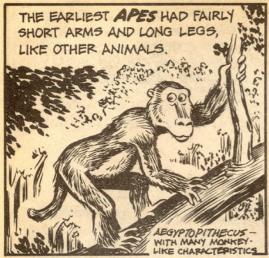
HALF-FORMED EMBRYO



WHILE MOST MARSUPIALS ARE

NOW ENDANGERED SPECIES, ONE,

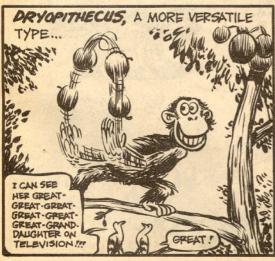








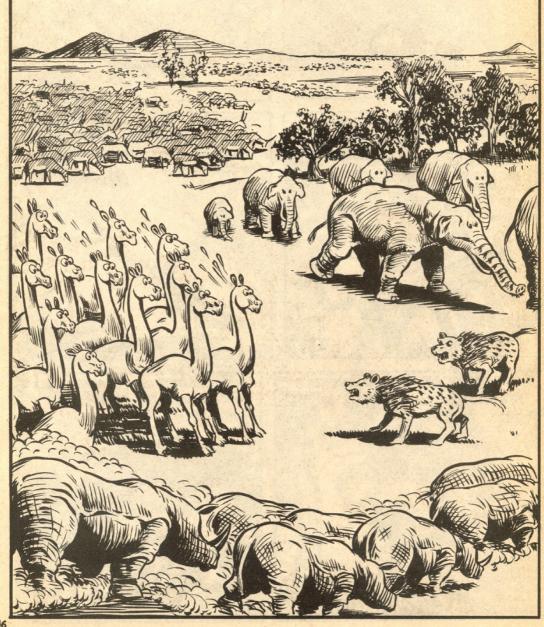




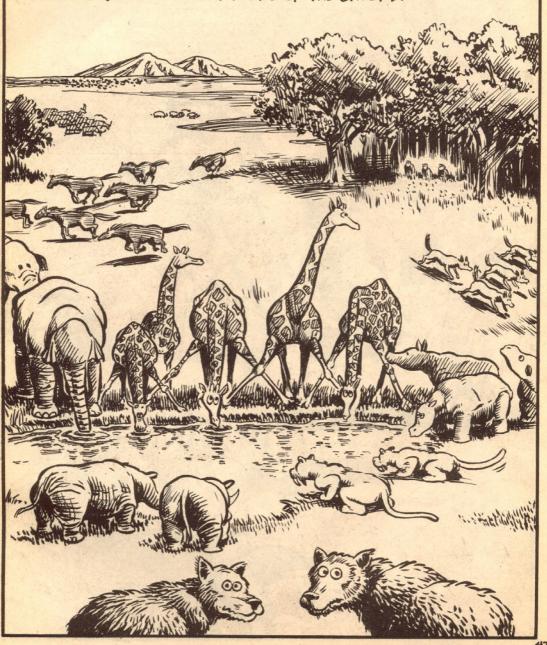


AND THE OBSCURE RAMAPITHECUS

ND SO WE COME TO THE PLACID PLIOCENE, CLIMAX OF THE AGE OF MAMMALS. DURING THE PLIOCENE, THE MIOCENE JUNGLES RECEDED, GIVING WAY TO VAST PLAINS COVERED WITH HERDS OF ANTELOPES, 3 TOED HORSES, CAMELS, GIRAFFES, RHINOS, AND MASTODONS. PLIOCENE CARNIVORES INCLUDED SABER TOOTHED CATS, DOGS, "DOG-BEARS," AND HYENAS.



AS THE SAVANNAH ENCROACHED ON THEIR FOREST HOME, SOME OF THE PRIMATES WERE FINALLY FORCED OUT OF THE TREES. A GROUP OF PLIOCENE MONKEYS TOOK TO THE PLAINS AND EVOLVED INTO BABOOMS. OF THE APES, ONLY RAMAPITHECUS STEPPED ONTO THE STEPPE, AT FIRST MAKING SHORT FORAYS FOR FOOD, BUT GRADUALLY STAYING LONGER AND LONGER. BY THE END OF THE EPOCH, THIS PRIMATE WALKED UPRIGHT ON TWO LEGS, AND WAS ADAPTED (MORE OR LESS) TO LIFE ON THE GROUND.

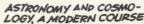






IF YOU STILL HAVE THE ENERGY TO READ MORE ON THE SUBJECT. I RECOMMEND THE FOLLOWING)

BOOKS:



BY FRED HOYLE. FRED HAS FINALLY COME AROUND ON THE BIG BANG. ALSO HAS INFO ON DN.A. & GENETIC CODE (!)

NEW FRONTIERS IN ASTRONOMY

A SCIENTIFIC AMERICAN COLLECTION NOT ALL HEAVY GOING, AND SOME GREAT PICTURES.

IN QUEST OF QUASARS BY B. BOVA

THE FIRST THREE MUNUTES BY STEPHEN WEINBERG, TITLE

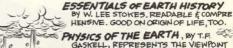
5055165, BY RHODES, ZIM, & SCHAFFER POCKET SIZED AND COLORFUL.

THE FOSSIL BOOK, BY CL. AND M.A. FENTON. MILLIONS OF MEDIOCRE DRAWINGS

THE ORIGIN OF SPECIES, BY CHARLES DARWIN. THE AUTHOR SHOWS PROMISE.

EVOLUTIONARY BIOLOGY BY STANLEY SALTHE. I READ IT, BUT I CAN'T REMEMBER IT!

THE LIVES OF A CELL, BY LEWIS THOMAS, METAPHYSICAL MUSING ON MITOCHONDRIA



GASKELL, REPRESENTS THE VIEWPOINT OF THE OIL CARTEL.

HISTORICAL GEOLOGY, BY CARL DUNBAR, MORE THAN YOU EVER WANTED TO KNOW ABOUT IGNEOUS SCHIST.

THE ECONOMY OF NATURE AND THE EVOLUTION OF SEX

BY M.T. GHISELIN. AN AMAZING BOOK! RIGHT-WING, CRANKY AND DENSE, BUT ALSO WITT PROVOCATIVE, AND INFORMATIVE

THE REPRODUCTION OF LIFE, BY P.L. LEHRMAN, IS

A MORE EASY-GOING AND ELEMENTARY TREATMENT.

PALEOZOIC FISHES BY J.A. MOY THOMAS

REVISED BY R.S. MILES. NOT MANY LAUGHS, BUT SOME LOVELY LINE DRAWINGS.

DINOSAURS BY EDWIN COLBERT. THE STANDARD WORK

MANDAMAN

DINOSAUR RENAISSANCE ARTICLE IN APR, 1975, SCIENTIFIC AMERICAN, BY UPSTART THEORIST ROBERT BAKKER, WHO MAKES A STRONG CASE FOR -

THE HOT-BLOODED DINOSAURS BY

ADRIAN DESMOND. COVERS ALL THE LATEST IN MESOZOIC MONSTERS

ANCIENT PLANTS AND THE WORLD THEY LIVED IN BY HENRY N. ANDREWS, JR. A BEAUTIFULLY . WRITTEN AND

ILLUSTRATED BOOK BY A FOSSIL FERN ENTHUSIAST. ONE OF MY FAVORITES.

THE AGE OF MAMMALS BY BJORN KURTEN. HE'S NO COLBERT, BUT NOT BAD.

MAMMALS, BY THE TIME-LIFE PUBLISHING EMPIRE. GOOD PIX.

HISTORY OF THE PRIMATES BY W.E. LEGROS CLARK. IF YOU'VE EVER WONDERED

HOW YOUR TEETH DIFFER FROM A GORILLA'S, THIS BOOK WILL TELL YOU.

NOW, IF YOU'LL EXCUSE ME, I'M GOING TO REST UP FOR VOLUME 2!

